IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

WSOU INVESTMENTS, LLC D/B/A BRAZOS LICENSING AND DEVELOPMENT, Plaintiff, v. **ARISTA NETWORKS, INC.,** Defendant.	Civil Action No. 6:20-cv-1083-ADA JURY TRIAL DEMANDED

DECLARATION OF DR. JOHN R. BLACK IN SUPPORT OF ARISTA NETWORKS, INC.'S OPENING CLAIM CONSTRUCTION BRIEF

I, John R. Black, declare as follows:

I. INTRODUCTION AND QUALIFICATIONS

1. I have been retained on behalf of Arista Networks, Inc. ("Arista") in the above-captioned matter to provide this declaration concerning technical subject matter relevant to claim construction for U.S. Patent No. 7,409,715 (the "'715 patent"), U.S. Patent No. 8,472,447 (the "'447 patent"), and U.S. Patent No. 9,450,884 (the "'884 patent") (collectively, the "Asserted Patents").

2. I am over 18 years of age. I have personal knowledge of the facts stated in this declaration and could testify competently to them if asked to do so.

3. In formulating my opinions, I have relied upon my training, knowledge, and experience in the relevant art. A copy of my *curriculum vitae* is appended to this Declaration as Appendix A and provides a description of my professional experience, including my academic and employment history, publications, conference participation, awards and honors, and more. The following is a brief summary of my relevant qualifications and professional experience.

4. I hold a Bachelor of Science from the California State University at Hayward (now "California State University, East Bay") in Mathematics and Computer Science, conferred in 1988. After my B.S. degree in 1988, I worked for 6 years for Ingres Corp. as a software developer. Then, in 1995, I started working toward a Ph.D. in Computer Science at the University of California at Davis. I received a Doctor of Philosophy in Computer Science from the University of California at Davis in 2000. The focus of my graduate work was Cryptography and Network Security.

5. After receiving my Ph.D., I became an Assistant Professor of Computer Science at the University of Nevada, Reno. After two years, I was appointed as an Assistant Professor of Computer Science at my current institution, which is the University of Colorado at Boulder. In

2008, I was promoted to the position of Associate Professor of Computer Science, which is my current title.

6. My area of interest is cryptography and security, including the security of computer systems and networks. I have worked with networks and networking protocols for most of my adult life and much of my research touches upon improving networking protocols primarily by improving their performance and/or security.

7. I have taught more than 40 classes in computer science, on subjects related to networking, cryptography, and security, including the following classes:

- Advanced Algorithms;
- Algorithms;
- Computer Networking;
- Data Structures;
- Discrete Mathematics;
- Entrepreneurial Projects;
- Foundations of Computer and Network Security;
- Introduction to Cryptography and Cryptanalysis;
- Security & Ethical Hacking.

8. I have authored or coauthored more than 25 journal publications, refereed conference publications, and book chapters, primarily on issues relating to computer and network security and cryptography. During my time as a professor I have received numerous awards including the NSF CAREER award for young researchers and various awards for teaching.

9. In 2015 I took a 2.5 year leave from the University to co-found a startup called "SecureSet" that taught computer and network security in a bootcamp format in order to attempt to address the shortfall in qualified network security professionals needed in the United States. I

designed the curriculum taught and served as the Vice President of Education until I left the company in order to resume my position at the University.

10. At times I have served as a consultant on technical matters related to cryptography and network security. For example, I helped FitBit design the encryption protocol for their wireless device downloads, I wrote the code that provides the network security for the Comverge Pro1 wireless thermostat, and I wrote the security platform for the Android music stream app called Yonder.

11. In light of the foregoing, I consider myself to be an expert in the fields of networking and computer networks, and believe that I am qualified to provide an opinion as to what a person of ordinary skill in the art would have understood, known, or concluded regarding the subject matter of the Asserted Patents at the time of the alleged inventions.

12. I am being compensated for the time I have spent on this matter at my customary rate of $625 per hour, plus reimbursement for expenses. My compensation does not depend in any way upon the opinions or testimony that I provide or the outcome of this matter.

13. My opinions expressed herein are based on my review and analysis of certain information obtained in connection with my work on this matter, together with my training, education, and experience. The opinions expressed herein are my own.

14. In my analysis, I considered the Asserted Patents, their file histories, the extrinsic evidence produced by the parties as part of claim construction, as well as the documentation discussed below.

15. I understand that WSOU has not yet provided any analysis or argument to supports its proposed constructions, and may offer expert testimony to support its proposed constructions.

I reserve the right to respond to any arguments made by WSOU or opinions offered by WSOU's expert.

II. THE '715 PATENT

16. The '715 patent is titled "Mechanism for Detection of Attacks Based on Impersonation in a Wireless Network." The Abstract of the '715 patent summarizes its contents:

> An impersonation detection system for a wireless node of a wireless communication network is described. The system comprises an intrusion detection module for correlating the original data frames transmitted by the wireless node with incoming data frames received over the air interface. The wireless node is connected to the intrusion detection module over a secure link, for receiving a copy of the original data frames. A method for detecting impersonation based attacks at a wireless node is also disclosed.

'715 patent at Abstract. The purported invention is meant to provide a reliable way to differentiate legitimate traffic sent by a node "from malicious traffic generated by an attacker node masquerading as the real node." '715 patent at 2:35-44.

17. I understand that patents and patent claims are viewed from the standpoint of a person having ordinary skill in the art at the time of the invention ("POSA"). From my review of the '715 patent, my current opinion is that a POSA of the '715 patent would have had a minimum of a B.S. in electrical engineering, computer engineering, computer science, or a related field, as well as 2-3 years of industry experience working with wireless devices and network security systems. Higher education by way of advanced degrees could substitute for years of experience. I reserve the right to alter my opinion in the future should new information be provided to me.

A. "connection means between the wireless node and the intrusion detection module for providing the intrusion detection module with a copy of the original data frames"

18. This claim element appears in claim 10 of the '715 patent. I understand that both parties agree that this phrase should be construed as a means-plus-function term. I understand that

the first step in construing a means-plus-function term is to identify the function claimed. I understand that the second step in construing a means-plus-function term is to identify the corresponding structure disclosed in the specification that performs the claimed function. I understand that if multiple functions are claimed, the structure disclosed in the specification must perform all of the claimed functions. I understand that structure disclosed in the specification qualifies as corresponding structure only if the intrinsic evidence, such as the patent and its file history, clearly links or associates that structure to the function or functions recited in the claim.

19. As to the claimed function, I understand that Arista asserts that the claimed function is "providing the intrusion detection module with a copy of the original data frames." I understand that WSOU asserts that the claimed function is "providing the intrusion detection module with a copy of the original data frames transmitted by the wireless node over a wireless interface." I note that the parties identify the same claimed function, with the exception that WSOU has included the additional underlined language. I also note that Arista's proposed function is identical to the claim language, whereas WSOU's proposed function adds the underlined portion to the claim language. Because the language added by WSOU is not in the claim term, I agree with Arista's proposal of the claimed function.

20. As to the corresponding structure, I understand that Arista asserts that the corresponding structure is "secure link 30, operating according to a respective communication protocol" in Figure 1, as well as equivalents thereof. I understand that WSOU asserts that the corresponding structure is "the wireless interface 14 in accordance with the procedures set forth, *e.g.*, in the specification at 2:17–20; 2:55–64; 2:65–3:6; 3:7–14; 3:41–46; 3:54–63; 4:16–23; and FIG. 1 as well as equivalents thereof."

21. In my opinion, Arista has identified the correct corresponding structure for the claimed function. The '715 patent consists of only two figures, and only Figure 1 shows components of a system. In describing Figure 1, the specification states: "System 1 includes a respective transmitter unit 15 at node 10, connected to a receiver unit 25 at intrusion detection module 20 over secure link 30, operating according to a respective communication protocol." '715 patent at 4:1-4. The language in this passage describing how the node 10 is connected to intrusion detection module 20 is identical to Arista's proposed corresponding structure. The specification goes on to explain that "Node 10 also sends a copy of the original data A to the intrusion detection module 20 over the secure link 30." '715 patent at 4:22-23. I also note that, consistent with the above discussion from the specification and Arista's proposed corresponding structure, the Abstract states: "The wireless node is connected to the intrusion detection module over a secure link, for receiving a copy of the original data frames." '715 patent at Abstract. Similarly consistent is the statement: "The invention comprises an intrusion detection module connected to the wireless node under surveillance by a secure link. The wireless node sends to the intrusion detection module a copy of the traffic it sent to the wireless interface over the secure link." '715 patent at 3:41-46. In my opinion, these passages make clear that the "connection means" that performs the claimed function is the secure link 30, which operates according to a respective communication protocol. From my review of the specification, no other structure is described as the connection between the wireless node and the intrusion detection module for providing a copy of the original data frames.

22. WSOU identifies "the wireless interface 14 in accordance with the procedures set forth, *e.g.*, in the specification at 2:17–20; 2:55–64; 2:65–3:6; 3:7–14; 3:41–46; 3:54–63; 4:16–23; and FIG. 1" as the corresponding structure. This is incorrect because the claimed function

refers to providing "a copy of the original data frame." In the specification, wireless interface 14 is associated with providing the original data, not a copy of the original data, as discussed below. This is true even accepting the additional language added to the function by WSOU because the function is still referring to the "copy of the original data frames." As noted above, only the secure link 30 is described in the specification as providing the copy.

23. For example, the specification states: "Node 10 generates original data denoted with A, which is modulated over the wireless channels that are allocated to node 10, as well known, and an antenna 12 transmits wireless traffic a over wireless interface 14." '715 patent at 4:16-19. This transmission of "original data" is contrasted in the same paragraph with the sending of "a copy of the original data" over the secure link. '715 patent at 4:22-23. Only the latter is associated with the claimed function. The wireless interface 14 is not linked or associated with the function of providing a copy of the original data.

24. I have reviewed the specification citations that WSOU included in its proposed corresponding structure, and they do not change my opinion. Those that appear relevant further reinforce my opinion that Arista's proposed corresponding structure is correct, and WSOU's is wrong because they too identify secure link as the connection means associated with the copy of the original data. *See, e.g.*, '715 patent at 3:3-6, 3:12-14.

25. In summary, I agree with Arista that the claimed function for this term is "providing the intrusion detection module with a copy of the original data frames," and that the corresponding structure disclosed in the specification is "secure link 30, operating according to a respective communication protocol" in Figure 1, and equivalents thereof.

B. "means for transmitting outgoing data frames over a wireless interface"

26. This claim element appears in claim 17 of the '715 patent. I understand that both parties agree that this phrase should be construed as a means-plus-function term.

27. As to the claimed function, I understand that Arista asserts that the claimed function is "transmitting outgoing data frames over a wireless interface." I understand that WSOU asserts that the claimed function is "transmitting outgoing data frames over a wireless interface via a transmitter." I note that the parties identify the same claimed function, with the exception that WSOU has included the additional underlined language. I also note that Arista's proposed function is identical to the claim language, whereas WSOU's proposed function adds the underlined portion. Because the language added by WSOU is not in the claim term, I agree with Arista's proposal of the claimed function.

28. As to the corresponding structure, I understand that Arista asserts that the corresponding structure is "antenna 12" in Figure 1, as well as equivalents thereof. I understand that WSOU asserts that the corresponding structure is "the node 10 of a wireless network in accordance with the procedure set forth, *e.g.*, in the specification at 3:64–4:4; 4:16–23; 4:26–27; 4:44–48; and FIGs. 1–2 as well as equivalents thereof."

29. In my opinion, Arista has identified the correct corresponding structure for the claimed function. The specification states: "Node 10 generates original data denoted with A, which is modulated over the wireless channels that are allocated to node 10, as well known, and an antenna 12 transmits wireless traffic a over wireless interface 14." '715 patent at 4:16-19. This passage specifically ties "transmitting outgoing data frames over a wireless interface"—the claimed function—to antenna 12. In clear terms, the specification says "antenna 12 transmits wireless traffic a over wireless interface 14." In the context of the patent, "outgoing data frames" and "wireless traffic a" are synonymous. *See, e.g.*, '715 patent at 3:7-9 (referring to "transmitting outgoing data frames over a wireless interface"), Fig. 1 (depicting "Wireless traffic a" going out

of wireless node 10 onto wireless interface 14). From my review of the specification, no other structure is clearly linked or associated with the claimed function.

30. WSOU identifies "the node 10 of a wireless network in accordance with the procedure set forth, *e.g.*, in the specification at 3:64–4:4; 4:16–23; 4:26–27; 4:44–48; and FIGs. 1–2" as the corresponding structure. But the passage at 4:16-19 says the node 10 "generates original data" and that the antenna 12 "transmits wireless traffic a over wireless interface 14." '715 patent at 4:16-19. Thus, the specification associates the node 10 with a generating function, but associates the antenna with the transmitting function recited in the claim.

31. WSOU has added the language "via a transmitter" to its proposed function. The only "transmitter" referred to in the specification is "transmitter unit 15," and that transmitter is not associated with this claimed function. *See* '715 patent at 4:1-4, Fig. 1. Instead, "transmitter unit 15" is "connected to a receiver unit 25 at intrusion detection module 20 over secure link 30." '715 patent at 4:1-4. As described in the previous section, this connection is for providing a copy of the original data from the node 10 to the intrusion detection module 20. It is not for transmitting outgoing data frames over a wireless interface as recited in the claim term of claim 17. Therefore, to the extent the "transmitter" referred to in WSOU's proposed function is transmitter unit 15, the transmitter is unrelated to the claimed function.

32. I have reviewed the specification citations that WSOU included in its proposed corresponding structure, and they do not change my opinion, as most do not appear relevant to this claim term, and those that are I have already addressed above.

33. In summary, I agree with Arista that the claimed function for this term is "transmitting outgoing data frames over a wireless interface," and that the corresponding structure disclosed in the specification is "antenna 12" in Figure 1, and equivalents thereof.

III. THE '447 PATENT

34. The '447 patent is titled "IP Multicast Snooping and Routing With Multi-Chassis Link Aggregation." The patent describes that "IP snooping refers to the process of listening to Internet Group Management Protocol (IGMP) network traffic between computing devices and routers to derive a map of which devices need which IP multicast streams. IP snooping is designed to prevent devices on a virtual local area network (VLAN) from receiving traffic for a multicast group they have not explicitly joined. For example, IP snooping typically provides switches with a mechanism to prune multicast traffic from links that do not contain a multicast listener (an IGMP client). Essentially, IP snooping is a Layer 2 optimization for Layer 3 IGMP." '447 patent at 2:62-3:5. The patent continues, "Since IP snooping takes place internally on switches, in a multi-chassis system, in which both Aggregation switches are active, each switch needs to have knowledge of which links to forward multicast traffic on." '447 patent at 3:6-8. The patent provides some background on link aggregation groups (or "LAGs") and introduces the term "multi-chassis link aggregation group (MC-LAG)" to refer to a LAG that "is split across two devices as seen in FIG. 1." '447 patent at 4:22-57.

35. Relevant to this declaration, the patent introduces a "chassis management module," at least one of which is included in an aggregation switch. *See* '447 patent at 4:7, 6:46-48. The chassis management module is described in the specification primarily by functions it performs and processes it runs. For example, the chassis management module is described as running an IP Multicast Snooping process, storing snooping information, and synchronizing snooping information between the two aggregation switches of the single "logical" switch. *See* '447 patent at 15:11-14, 19:32-41. The chassis management module is also tasked with computing "forwarding vectors" that are described as representing internal switching of traffic from its source port to VLAN ports, and creating a "multicast index." *See* '447 patent at 19:65-21:4, 23:13-24.

36. From my review of the '447 patent, my current opinion is that a POSA of the '447 patent would have had a minimum of a B.S. in electrical engineering, computer engineering, computer science, or a related field, as well as 4-6 years of industry experience designing or architecting network switch systems, working with networking protocols, and working with switching ASICs and hardware. Higher education by way of advanced degrees could substitute for years of experience. I reserve the right to alter my opinion in the future should new information be provided to me.

A. "Chassis Management Module"

37. The term "chassis management module" appears in asserted claims 1, 5, and 12-14. Claim 5 depends from claim 4, which in turn depends from claim 1. Claims 12-14 each depend from claim 1.

38. My opinions herein focus on potential treatment of "chassis management module" as a means-plus-function term in these claims. I have not considered any other claim construction issues with respect to this term, but reserve the right to respond to any arguments made by WSOU or opinions offered by WSOU's expert. I understand that Arista asserts that the "chassis management module" term should be treated as a means-plus-function term and has identified the functions of the "chassis management module" as:

- Claim 1:
    - "receiving the snooping information via at least the external ports";
    - "storing the snooping information within the database";
    - "sharing the snooping information substantially in real-time with the remote aggregation switch via the VFL";

- "build[ing] respective forwarding vectors for multicast traffic flows received from the at least one network node via the external ports or the VFL ports based on the snooping information"; and
- "determin[ing] a multicast index for a received multicast traffic flow to set-up hardware paths for forwarding the received multicast traffic flow to the external ports in a virtual local area network (VLAN) that requested the received multicast traffic flow via the at least one edge node."

- Claim 5: "receiv[ing] a portion of the snooping information from the remote aggregation switch via the VFL";
- Claim 12: "build[ing] the forwarding vector for the receiving multicast traffic flow based on the multicast index";
- Claim 13: "allocat[ing] the multicast index for the received multicast traffic flow";
- Claim 13: "sharing the multicast index with the secondary switch"; and
- Claim 14: "receiv[ing] the multicast index from the primary switch."

I understand that Arista asserts that there is no disclosed corresponding structure in the specification for the "receiving," "sharing," "building," and "determining" functions of claim 1; the "receiving" function of claim 5; the "building" functions of claim 12; and the "allocating" and "sharing" functions of claim 13. I understand that Arista asserts that "one or more processing devices," described as being part of the "chassis management module" is the corresponding structure for the remaining functions.

39. I understand that WSOU contends that "chassis management module" should not be treated as a means-plus-function term, does not need construction, and should be construed according to its plain and ordinary meaning. At the time of this writing, I understand that WSOU

has not identified what it believes the plain and ordinary meaning is, or any alternative construction should the Court find that the term is to be treated as means-plus-function. Should WSOU identify additional claim construction positions, I reserve the right to consider and address those new positions.

1. Means-Plus-Function Treatment

40. I understand that if a claim term does not use "means," there is a presumption that means-plus-function treatment does not apply. I understand that in determining whether a claim term should be treated as a means-plus-function term, the essential inquiry is whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure. I understand that means-plus-function treatment applies when the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. I agree with Arista that "chassis management module" should be treated as a means-plus-function term.

41. The claim language provides specific functions that are performed by the "chassis management module." First, the language of claim 1 describes that the "chassis management module" performs the functions of receiving snooping information, storing snooping information, and sharing snooping information. There is nothing else in the claim language that performs these functions, and nothing else recited in the claims as structure for performing these functions.

42. Second, the language of claim 1 includes two "wherein" clauses where additional functions are attributed to the "chassis management module." Specifically, these clauses add the functions of building respective forwarding vectors for multicast traffic flows and determining a multicast index for a received multicast traffic flow. Again, there is nothing else in the claim language that performs these functions, and nothing else recited in the claims as structure for performing these functions.

43. Third, the dependent claims include additional functions to be performed by the chassis management module. In claim 5, the claim language attributes receiving a portion of snooping information from the remote aggregation switch to the chassis management module. In claim 12, the claim language attributes building the forwarding vector based on the multicast index to the chassis management module. In claim 13, the claim language attributes allocating the multicast index for the receiving multicast traffic flow and sharing the multicast index to the chassis management module. Finally, in claim 14, the claim language attributes receiving the multicast index from the primary switch to the chassis management module of the secondary switch. For each of these dependent claims, there is nothing else in the claim language that performs these functions, and nothing else recited in the claims as structure for performing these functions.

44. The functions described in the preceding paragraphs are consistent with Arista's proposed construction of "chassis management module." In light of these functions, in my opinion the term "chassis management module" does not recite sufficient structure to a POSA for performing those functions. In fact, in my opinion, the term "chassis management module" is not one that would connote any sufficiently definite structure to a POSA.

45. The term on its own, "chassis management module," is not one that I am familiar with as a name for a specific structure or specific type of structure, and is not one that would call a specific structure or specific type of structure to the mind of a POSA. As a preliminary matter, I note that the term "chassis management module," or even "chassis management," is absent from a number of technical dictionaries produced in this matter. *See* Ex. 2,[1] Modern Dictionary of Electronics (1999); Ex. 3, The Authoritative Dictionary of IEEE Standards Terms (2000); Ex. 4,

[1] The "Ex." exhibits refer to exhibit provided with Arista's Opening Claim Construction Brief.

Data & Telecommunications Dictionary (1999); Ex. 5, Microsoft Computer Dictionary (1999); Ex. 6, Newton's Telecom Dictionary (2007). In my opinion, "chassis management module" is not a term of art, and it does not have a well understood meaning. The absence of the term from the preceding dictionaries supports my opinion.

46. Further, the term "module" as used the art to which the '447 patent pertains could refer to either hardware, software, or a combination of both, and does not connote any sufficiently definite structure. This appears consistent with the '447 patent's use of the term "module." *See* '447 patent at 26:61-67 ("One of average skill in the art will also recognize that the functional building blocks, and other illustrative blocks, ***modules*** and components herein, can be implemented as illustrated or by one or multiple discrete components, networks, systems, databases or processing ***modules*** executing appropriate software and the like or any combination thereof." (emphasis added)). And the claims do nothing to give even an idea of the possible structure of the "chassis management module" for a POSA. This is because the "chassis management module" is defined entirely by its function rather than any structure in the claims. There is nothing of structure related to the "chassis management module" in the claims and therefore no clue as to the type of structure intended. The closest things to structure are the references to various ports of the claimed switch through which data ultimately finds its way to the "chassis management module." But it is not even clear from the claims how the "chassis management module" may be connected to such ports. I note that the specification of the '447 patent appears to contemplate that any connections may be entirely indirect. *See* '447 patent at 26:16-43.

47. I also note that the modifier of "module," "chassis management," is also entirely functional. In the art and devices in the art to which the '447 patent pertains, there are any number

of ways to perform management of a device, including hardware devices and cards, firmware, software and operating systems software, configuration files, removable media, remote management over networks, and combinations of these approaches. That "chassis management" is simply an umbrella term for various functions is shown in extrinsic evidence produced by the parties. For example, the *Implementing Broadband Aggregation on Cisco 10000 Series* materials refers to "Chassis management" as "functionality" provided by Cisco IOS running on a "route processor." Ex. 7, *Implementing Broadband Aggregation on Cisco 10000 Series* at 8-20. Cisco IOS is the general name Cisco uses for its operating system software that runs on a number of its networking products. Similarly, the *HP 9000 rp8420 Server User Service Guide* materials refer to "Chassis management" as a "functional group[]" falling under the more general "Server management." Ex. 8, *HP 9000 rp8420 Server User Service Guide* at 92. The *BladeCenter chassis management* materials state that "chassis management is a multi-tiered management concept" and consistently discusses "chassis management" with respect to functions or functionality. Ex. 9, *BladeCenter chassis management* at 941-42. As stated above, a POSA would understand that such functionality could be provided in numerous ways and the term "chassis management module" would not connote any sufficiently definite structure.

48. I have also reviewed the '447 patent specification, provisional application, and file history and do not see any indication that "chassis management module" has a particular structural significance or is the name of a sufficiently definite structure. For example, Figure 3 (reproduced below) shows a "CMM A" and a "CMM B" in each of two switches, where "CMM" refers to "chassis management module" in the specification. *See, e.g.*, '447 patent at 4:8. But each is simply shown as a box without even a single connection to anything else in the figure. CMMs also appear in Figures 8, 11, and 12, but again shown simply as boxes, albeit with various connections. But

as noted above, the specification of the '447 patent appears to contemplate that any connections may be entirely indirect. *See* '447 patent at 26:16-43. And even if considered direct connections, they do not suggest a sufficiently definite structure for a "chassis management module."

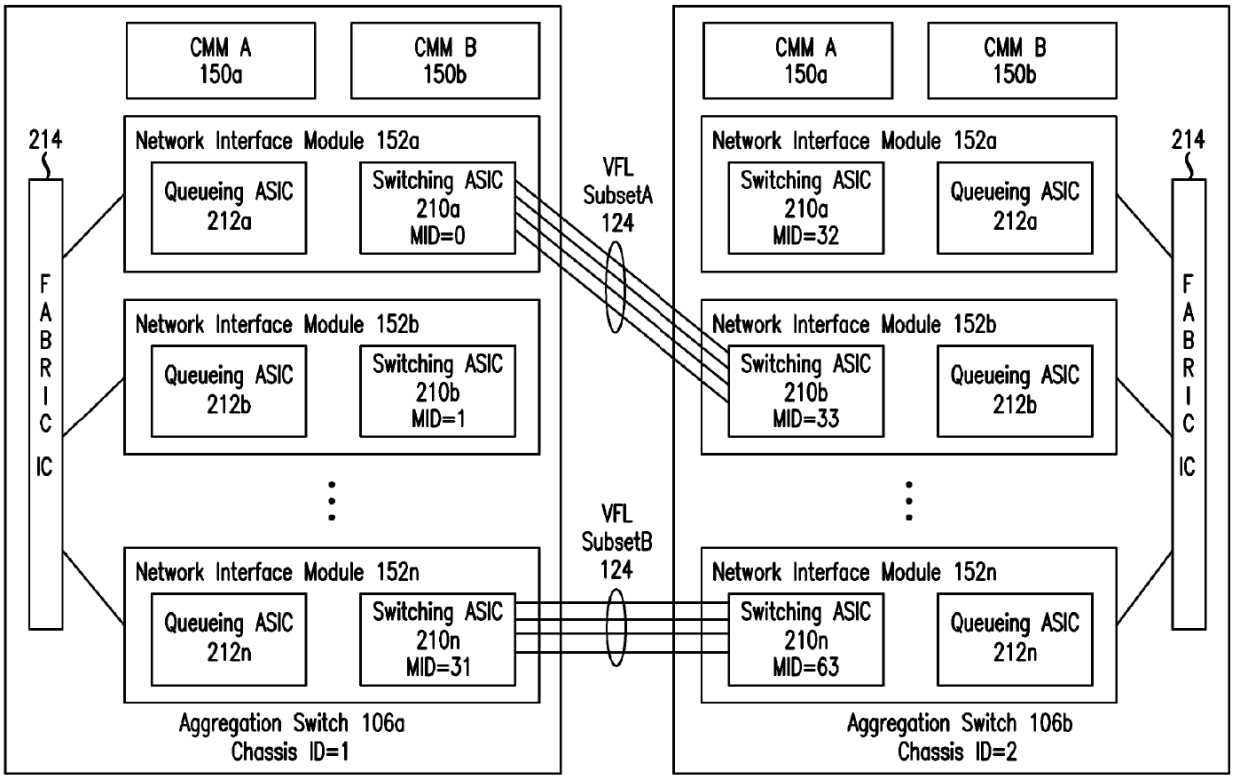

FIG. 3

49. The specification text likewise demonstrates that there is no sufficiently definite structure associated with "chassis management module." In particular, the description in column 23 suggests that the "chassis management module" could be almost anything:

> The network interface modules 152 and chassis management modules 150 each include one or more processing devices, such as a microprocessor, micro-controller, digital signal processor, microcomputer, central processing unit, field programmable gate array, programmable logic device, state machine, logic circuitry, analog circuitry, digital circuitry, ***and/or any device that manipulates signals (analog and/or digital)*** based on hard coding of the circuitry and/or operational instructions. The NIMs 152 and CMMs 150 also include a memory that is an ***internal*** memory ***or an external*** memory. The memory may be a single memory device or

> a plurality of memory devices. Such a memory device may be a read-only memory, random access memory, volatile memory, non-volatile memory, static memory, dynamic memory, flash memory, cache memory, ***and/or any device that stores digital information***. In addition, the NIMs 152 and CMMs 150 may implement one or more of their functions via a state machine, analog circuitry, digital circuitry, and/or logic circuitry, the memory storing the corresponding operational instructions may be embedded within, or external to, the circuitry comprising the state machine, analog circuitry, digital circuitry, and/or logic circuitry. Furthermore, the NIMs 152 and CMMs 150 may execute hard-coded and/or software and/or operational instructions stored by the internal memory and/or external memory ***to perform the steps and/or functions described herein*** and may be implemented in a single or in one or more integrated circuits.

'447 patent at 23:25-51 (emphases added). This description amounts to stating that the "chassis management module" is any black box of components that can process analog or digital data. This confirms that the term "chassis management module" as used in the specification is not even meant to refer to sufficiently definite structure. Instead, the references in the above passage to the "functions" described elsewhere in the specification show that "chassis management module" is specifically intended to be a black box that performs the described functionality. The black box nature of the "chassis management module" in the specification is confirmed by the fact that the "network interface modules 152" are described to have the same generic structure, despite the specification describing entirely different functions for those modules. If the specification attributes the same generic structure to these two different "modules," then even when "chassis management module" is read in light of the specification, a POSA would not understand it to be a name for a particular structure.

50. I have reviewed the extrinsic evidence produced by WSOU and see that there are a handful of papers produced that refer to a "chassis management module." But this evidence does not demonstrate that the term connotes sufficiently definite structure. For example, the *BladeCenter chassis management* materials show a "Management module 1" with components

like a DSP, Ethernet MAC/PHY, PowerPC, USB controller, analog video signals hardware, RS-485 interface and I^2C interfaces. *See* Ex. 9, *BladeCenter chassis management* at 943-44. By contrast, very little can be gleaned from the limited description of the "chassis management module" in the *ATCA Server Systems for Telecommunications Services* materials, making it impossible to tell whether it is comparable to the "Management module 1" in the *BladeCenter* materials. *See* Ex. 10, *ATCA Server Systems for Telecommunications Services*. The same is true of other materials produced by WSOU. While the evidence indicates that a handful of companies may have used the same term to refer to similar functional blocks, it does not demonstrate that the term "chassis management module" on its own connotes a sufficiently definite structure or that it would be a meaningful term to a POSA at the time of the patent's filing.

51. It is also my opinion that "chassis management module" does not provide sufficient structure for performing the recited functions in the claims outlined above. Because it does not connote sufficiently definite structure, it certainly does not provide a structure for performing the numerous functions in the claims related to handling of snooping information, building of forwarding vectors, and determining and sharing multicast indices.

52. Even if one were to assume that "chassis management module" connoted some structure—and I do not think it does—the extrinsic evidence produced by the parties confirms that whatever that hypothetical structure would be, a POSA would not understand it to be capable of performing the claimed functions. As described above, the prefix "chassis management" is itself functional and simply an umbrella term for various functions. But a POSA would not associate "chassis management" functions with the handling of snooping information, building of forwarding vectors, or determining and sharing multicast indices.

53. For example, the *HP 9000 rp8420 Server User Service Guide* materials state that "Chassis management consists of control and sensing the state of the server subsystems," including, for example, "Control and sensing of bulk power," "Control and sensing of fans," "Control of the front panel LEDs," "Sensing temperature," and "Sensing of the power switch." Ex. 8, *HP 9000 rp8420 Server User Service Guide* at 92. Likewise, the *BladeCenter chassis management* materials describes "chassis management functions" as "monitoring and error reporting, inventory management, configuration validation, power and thermal management, MM discovery, KVM controls, remote disk, serial over LAN (SOL), video, I/O module management, firmware updates, and chassis diagnostics." Ex. 9, *BladeCenter chassis management* at 942. And the *ATCA Server Systems for Telecommunications Services* materials describes that the "chassis management module" "controls and monitors the status of each unit." Ex. 10, *ATCA Server Systems for Telecommunications Services* at 217. The other extrinsic evidence is similar. Thus, at best, "chassis management" refers to basic control and monitoring of chassis-related items such as temperature, power modules, fans, and faults.

54. Nowhere in the extrinsic evidence do I see any reference to any "chassis management module" being involved in IGMP snooping—in stark contrast to the claimed snooping functions in the claims and attributed to the "chassis management module" in the '447 patent specification. *See, e.g.*, '447 patent at 19:32-41. Similarly, nowhere in the extrinsic evidence do I see any reference to any "chassis management module" building forwarding vectors for multicast traffic as the claimed "chassis management module" and the ones described in the specification do. *See, e.g.*, '447 patent at 20:7-15. And nowhere in the extrinsic evidence do I see any reference to any "chassis management module" handling a "multicast index" for multicast traffic flows as in the claims and specification. *See, e.g.*, '447 patent at 23:13-24. Indeed, I see no

reference at all of any processing related to network traffic being performed by a "chassis management module." In my opinion, even if a POSA were to attribute some structure to the term "chassis management module," that structure would not be one that was capable of performing the claimed functions.

55. Thus, in my opinion a POSA, reading the claims of the '447 patent, would not understand "chassis management module" to have a sufficiently definite meaning as the name for structure. The term itself does not connote any sufficiently definite structure. Furthermore, the term does not recite sufficient structure for performing the claimed functions. Thus, I agree with Arista that "chassis management module" should be construed as a means-plus-function term.

2. Lack of Corresponding Structure

56. I understand that a means-plus-function claim term is construed to cover the corresponding structure identified in the specification, and equivalents thereof, for performing the claimed functions. I also understand that structure disclosed in the specification is corresponding structure only if the specification and/or prosecution history clearly links or associates that structure to the function recited in the claim. I also understand that where a computer-implemented invention involves means-plus-function claiming, the structure disclosed in the specification must be a software algorithm. I also understand that if the specification does not disclose corresponding structure for a claimed function, the claim is indefinite. I understand that a claim term may also be indefinite if the claim, read in light of the specification and the prosecution history, fails to inform, with reasonable certainty, those skilled in the art about the scope of the invention.

57. As noted above, I understand that Arista asserts that there is no disclosed corresponding structure in the specification for the "receiving," "sharing," "building," and "determining" functions of claim 1; the "receiving" function of claim 5; the "building" function of

claim 12; and the "allocating" and "sharing" functions of claim 13. I have focused my analysis below on the specification's disclosure or lack of disclosure related to these specific functions.

58. As also noted above, the specification attributes no sufficiently definite structure to the "chassis management module." But the specification does state that the chassis management module includes "one or more processing devices . . . that manipulates signals (analog and/or digital) based on hard coding of the circuitry and/or operational instructions." '447 patent at 23:25-33. It further states that the chassis management module "may implement one or more of [its] functions" via stored "operational instructions" and may "execute hard-coded and/or software and/or operational instructions . . . to perform the steps and/or functions described" in the specification. '447 patent at 23:40-51. A POSA would understand this description, in the context of the functions described in the specification, to indicate that "chassis management module" is a computer-implemented or specially programmed processor means-plus-function term, and therefore requires disclosure of an algorithm as corresponding structure for any specialized claimed functions.

a. Claim 1: "receiving the snooping information via at least the external ports"

59. As described in the patent, receiving the snooping information is a function that requires specialized programming and/or design to implement. That is because snooping information is described as "derived" or "discovered" information. *See, e.g.*, '447 patent at 19:1-3, 19:65-20:7. The patent provides some background on what it means by "snooping information":

> In particular, with respect to Internet Protocol (IP) multicast snooping, information ***learned*** on one of the Aggregation switches may need to be shared with the other Aggregation switch for efficient switching and for redundancy purposes. IP snooping refers to the process of ***listening*** to Internet Group Management Protocol (IGMP) network traffic between computing devices and routers to derive a map of which devices need which IP multicast streams. IP snooping is designed to prevent devices on a virtual local area

> network (VLAN) from receiving traffic for a multicast group they have not explicitly jointed. For example, IP snooping typically provides witches with a mechanism to prune multicast traffic from links that do not contain a multicast listener (an IGMP client). Essentially, IP snooping is a Layer 2 optimization for Layer 3 IGMP.

'447 patent at 2:58-3:5 (emphasis added). Other descriptions are similar. *See, e.g.*, *id.* at 18:48-59, 19:1-3, 19:65-20:7, 20:29-33, 20:59-67, 21:48-56; *see also id.* at Abstract. What is happening is that the switch is examining the Layer 3 packets to extract or derive the "snooping information" that it can use to determine which VLAN ports actually need multicast traffic to avoid sending multicast traffic unnecessarily to VLAN ports that do not need it. Snooping functionality existed in the art before the '447 patent and would be understood in this way to a POSA.

60. In the context of the '447 patent, this function of "receiving" such "snooping information" is implemented by a software process in the "chassis management module," and links this process to the "receiving the snooping information via at least the external ports" function. The specification states:

> Each of the CMMs 150 (CMM-P and CMM-S) ***runs a respective IPMS (IP Multicast Snooping) process*** and stores respective IP multicast snooping information 406 within a respective database 405a and 405b. In an embodiment, the IPMS (IP Multicast Snooping) processes on the CMMs 150 of each Aggregation Switch 106a and 106b are synchronized via the VFL 124. For example, the IP multicast snooping information 406 can be transferred between the Aggregation Switches 106a and 106b using proprietary messages via the inter-chassis IPC (shown in FIG. 8). Thus, ***the IPMS process on each CMM 150 processes packets*** from either from the Virtual Fabric Link 124 or ***the external ports*** (e.g., ports 240a, 240c and 2400 as normal multicast packets and updates their respective tables accordingly.

'447 patent at 19:32-45 (emphasis added). Consistent with IP snooping, the specification describes that the "chassis management module" derives information from the packets as "snooping information" (i.e., "processes packets" and thereby receives the snooping information).

Specifically, the specification states that the "chassis management module" "stores flow information ***derived*** from the IP multicast traffic 404 ***as IP multicast snooping information 406*** within database 405a. As part of the IP multicast snooping information 406, the CMM-P may also create a flow record for the IP multicast traffic 404 and store the flow record, along with hardware device information for the IP multicast traffic 404 (e.g., the port ID of the external port 240a that received the IP multicast traffic 404 as the source port) in the database 405a." '447 patent at 19:65-20:7 (emphasis added); *see also id.* at 20:29-33, 20:59-67, 21:48-56. While the patent describes that the "chassis management module" derives and thereby receives this information, and describes what some of that information is and where it may come from, the specification fails to provide an algorithm for the IPMS process to actually perform the receiving function. The specification just restates the function. *See, e.g.*, *id.* at Fig. 14.

b. Claim 1: "sharing the snooping information substantially in real-time with the remote aggregation switch via the VFL" & Claim 5: "receiv[ing] a portion of the snooping information from the remote aggregation switch via the VFL"

61. In the context of the '447 patent, these two functions require specialized programming and/or design to implement. In particular, the "sharing" function requires that sharing occur "substantially in real-time." The patent describes that cooperating aggregation switches perform IGMP snooping, as discussed above, but in the context of the described invention, require "various modifications." '447 patent at 18:48-67. The specification continues: "In particular, each Aggregate Switch 106a and 106b can be configured to share their discovered IP multicast snooping information with the other Aggregate Switch 106a and 106b via the VFL 124, so that each switch has knowledge of which links to forward multicast traffic on and to prevent unnecessary routing of multicast traffic over the VFL 124." *Id.* at 18:67-19:7. The specification makes reference to the IPMS processes being "synchronized," for example through "proprietary

messages via the inter-chassis IPC," and that the "chassis management module" "shares" snooping information with the other switch. *See, e.g.*, *id.* at 19:35-41, 20:16-19, 20:46-49, 21:5-9. But there is no algorithm provided for how sharing is performed. For example, the specification does not explain the proprietary messages, and does not explain what is meant by providing the snooping information "substantially in real-time." Furthermore, in some instances, the specification describes that the "chassis management module" "may" share the snooping information, suggesting it can choose whether to share or not. *See, e.g.*, *id.* at 21:38-44, 22:1-7. But there is no explanation of an algorithm that would allow a POSA to know when the information must be shared versus when it may be shared, leaving the "sharing" function unclear. In sum, the specification just restates the function without a sufficient algorithm. *See, e.g.*, *id.* at Fig. 14.

62. Claim 5's "receiv[ing] a portion of the snooping information from the remote aggregation switch via the VFL" function is similar to the sharing function, but is going in the opposite direction and no algorithm is disclosed for similar reasons. Furthermore, claim 5's function refers to only "a portion of the snooping information," and requires specific information to be included in the portion. But the specification does not explain what the "portion" is—which portion of snooping information should be received. There is no algorithm or explanation for determining which portion should be shared and thereby received as claimed.

c. Claim 1: "build[ing] respective forwarding vectors for multicast traffic flows received from the at least one network node via the external ports or the VLF ports based on the snooping information"

63. Building a forwarding vector in a switch is a function that requires specialized programming and/or design to implement. The specification provides a handful of example instances when a forwarding vector would be computed, with reference to Figure 11. Below is the first one in the specification, with Figure 11 reproduced below that:

> For example, IP multicast traffic 404 received on port 240a from network node 116 is reported to CMM-P 150, which stores flow information derived from the IP multicast traffic 404 as IP multicast snooping information 406 within database 405a. As part of the IP multicast snooping information 406, the CMM-P may also create a flow record for the IP multicast traffic 404 and store the flow record, along with hardware device information for the IP multicast traffic 404 (e.g., the port ID of the external port 240a that received the IP multicast traffic 404 as the source port) in the database 405a. ***The CMM-P further uses the hardware device information to compute a forwarding vector 407a for the IP multicast traffic 404***. The forwarding vector 407a represents the internal switching of the IP multicast traffic 404 from the source port (external port 240a) to one or more VLAN ports for forwarding of the IP multicast traffic 404 to the home network devices 112 that requested the IP multicast traffic.

'447 patent at 19:65-20:15 (emphasis added). Other descriptions of other examples are similar to this one, though not all refer specifically to multicast traffic as in the claims. *See* '447 patent at 20:24-28, 20:39-45, 20:55-58, 21:1-4, 21:29-32, 21:56-60.

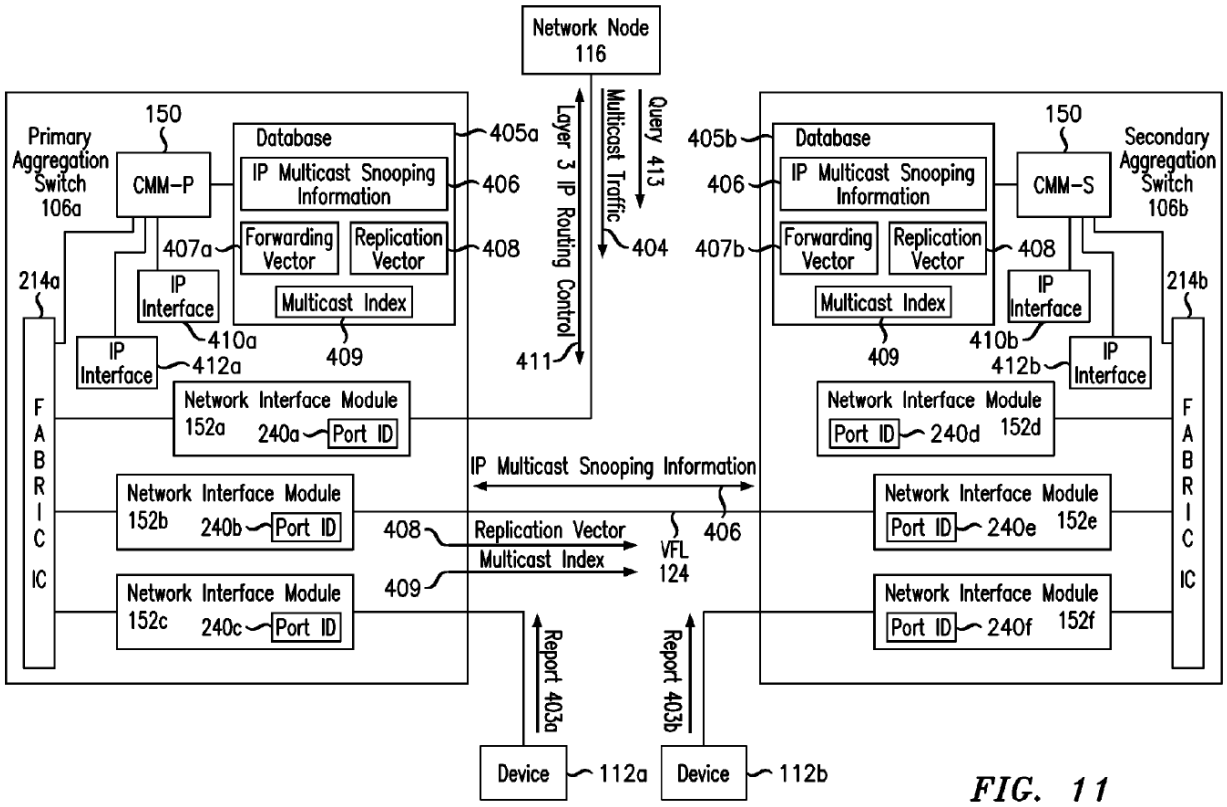

FIG. 11

64. As the above passage shows, the specification generally describes a forwarding vector as a vector that "represents the internal switching of the IP multicast traffic 404 from the source port . . . to one or more VLAN ports for forwarding of the IP multicast traffic 404 to the home network devices 112 that requested the IP multicast traffic." '447 patent at 20:10-15.

65. But the specification never provides an algorithm for how the chassis management module actually "builds respective forwarding vectors for multicast traffic flows" as claimed. The above passage certainly states that the chassis management module "computes" a forwarding vector for a particular multicast traffic 404, but does not explain that computation beyond stating that it is performed. The only clue is that the chassis management module "uses the hardware device information" to do so. The example provides only an example of hardware device information: "the port ID of the external port 240a that received the IP multicast traffic 404 as the source port." '447 patent at 20:4-7. But there is no explanation of how to get from the port ID to the forwarding vector. For example, there is no explanation for how the port ID on which a particular multicast traffic arrives is translated to one or more VLAN ports for forwarding of the IP multicast traffic to the home network devices that requested the IP multicast traffic. There is also no explanation for how different multicast traffic arriving on the same port ID could be translated differently to one or more VLAN ports for forwarding of the IP multicast traffic to the home network devices that requested the IP multicast traffic.

66. I note that the specification provides some additional examples related to the forwarding vector at 23:64-24:35. One states, "Since Edge Node A 104a is connected to Aggregation Switch 106a via a fixed port (e.g., port 1 of Switching ASIC MID=12), the forwarding vector in Aggregation Switch 106a would indicate that the multicast traffic 404 should be forwarded over port 1 of Switching ASIC MID=12." '447 patent at 24:1-6. These examples only

provide the end result of the forwarding vector computation, but do not provide algorithmic detail as to how the forwarding vector is computed or built.

d. Claim 1: "determin[ing] a multicast index for a received multicast traffic flow to set-up hardware paths for forwarding the received multicast traffic flow to the external ports in a virtual local area network (VLAN) that requested the received multicast traffic flow via the at least one edge node"

67. The specification says very little about the multicast index, all of which appears in column 23 of the '447 patent. First, the specification states:

> Moreover, the CMM-P is further responsible for creating the multicast index 409 for a particular received multicast stream (e.g., multicast traffic 404) and for sharing the multicast index 409 with the CMM-S 150 on the Secondary Aggregation Switch 106b via the VFL 124. The multicast index 409 is a unique identifier assigned to an ingressing multicast flow based on the IP source, the destination addresses and ingress VLAN that enables each port to determine whether or not to forward the multicast flow. Since multicast flows may be passed over the VFL 125, the multicast indices are a globally shared resource between switches 106a and 106b.

'447 patent at 23:13-24. Later in column 23, the specification states:

> Upon receipt of the multicast traffic 404, CMM-P 150 on Aggregation Switch 106a accesses the database 405a to store/retrieve IP multicast snooping information and to compute the replication vector, forwarding vector and multicast index for the multicast traffic 404 to switch the multicast traffic 404 to the appropriate external ports for forwarding to the VLANs containing home network devices that requested the multicast traffic 404.

'447 patent at 23:56-63. In light of the above passages, this function requires specialized programming and/or design to implement.

68. But in neither of these passages is an algorithm provided for how the chassis management module "determines a multicast index" as claimed. It is unclear whether "creating the multicast index" or "to compute" it is the same as determining it, and the specification never uses the word "determine" or similar in reference to a multicast index. Even if I were to assume

that determining and creating or computing were the same, these passages do not provide any algorithmic detail for a POSA to know how to program a processor to determine a multicast index for a received multicast traffic flow. For example, there are no examples of how a multicast index is even used in setting up hardware paths to know what it is that is being determined, let alone how to determine it. Absent more information in the specification, I do not believe that these passages provide algorithmic detail for this claimed function.

e. Claim 12: "build[ing] the forwarding vector for the receiving multicast traffic flow based on the multicast index"

69. The previous section shows the entirety of the disclosure in the specification related to the multicast index. Nowhere in the specification is there any description, let alone an algorithm, for how the forwarding vector could be built based on the multicast index. As stated in the previous section, there are simply no examples of how a multicast index is used. And as stated in the section above on claim 1's "building" function, such a function requires specialized programming and/or design to implement, and there is no algorithmic detail for building any forwarding vector, and certainly none for building a forwarding vector based on the multicast index.

f. Claim 13: "allocat[ing] the multicast index for the received traffic flow" & "shar[ing] the multicast index with the secondary switch"

70. Again, the above section on claim 1's "determining" function shows the entirety of the disclosure in the specification related to the multicast index. The word "allocates" or similar is not used anywhere in the specification. The only verbs in the specification used in connection with the chassis management module and the multicast index are "creating," "sharing," and "to compute." From the claims, it could perhaps be inferred that allocating refers to assigning a multicast index to a particular multicast flow or making a selection of which indices go with which flows, though it is unclear if that is even different from the "determining" function of claim 1.

Regardless, such a function requires specialized programming and/or design to implement. But nothing like this is described in the specification and certainly no algorithm for doing so is provided. Again, absent some example of using the multicast index or creating it, the specification does not provide an algorithm for this claimed function.

71. As to the "sharing" function of claim 13, the specification does not provide any explanation or algorithm as to how the multicast index is shared. The specification simply assigns the function to the "chassis management module" without further explanation. *See* '447 patent at 23:13-18. This "sharing" requires specialized programming and/or design to implement because a general purpose processor would not be equipped to provide this kind of information in the claimed environment. But the specification provides no explanation of the algorithmic structure that allows for sharing the multicast index. Furthermore, neither the claim nor the specification is clear about any structure that allows such data to be shared in the first place.

g. Remaining Claimed Functions

72. As to the remaining claimed functions for the "chassis management module," specifically the "storing" function of claim 1 and the "receiving" function of claim 14, I agree with Arista's position that, in the context of the claims, these are functions that can be performed by a general purpose processor.

73. In summary, it is my opinion that "chassis management module" in claims 1, 5, 12, 13, and 14 should be construed as a means-plus-function term because it fails to connote sufficiently definite structure to a POSA and because the claims recite functions performed by the chassis management module without reciting sufficient structure for performing those functions. Furthermore, it is my opinion that the specification fails to disclose corresponding structure by way of an algorithm for claim 1's "receiving the snooping information via at least the external ports" function; claim 1's "sharing the snooping information substantially in real-time with the

remote aggregation switch via the VFL" function; claim 1's "build[ing] respective forwarding vectors for multicast traffic flows received from the at least one network node via the external ports or the VLF ports based on the snooping information" function; claim 1's "determin[ing] a multicast index for a received multicast traffic flow to set-up hardware paths for forwarding the received multicast traffic flow to the external ports in a virtual local area network (VLAN) that requested the received multicast traffic flow via the at least one edge node" function; claim 5's "receiv[ing] a portion of the snooping information form the remote aggregation switch via the VFL" function; claim 12's "build[ing] the forwarding vector for the receiving multicast traffic flow based on the multicast index" function; and claim 13's "allocat[ing] the multicast index for the received multicast traffic flow" and "shar[ing] the multicast index with the secondary switch" functions.

B. "Multicast Index"

74. The term "multicast index" appears in claims 1 and 12-15. Claims and 1 and 15 are independent claims, while claims 12-14 each depend from claim 1.

75. I understand that a patentee can define a term in the specification, and that in such instances, the patentee's definition controls and is to be used in the claims. In my opinion, a POSA reviewing 23:18-22 of the '447 patent would understand that language to be a definition for "multicast index." The passage states: "The multicast index 409 is a unique identifier assigned to an ingressing multicast flow based on the IP source, the destination addresses and ingress VLAN that enables each port to determine whether or not to forward the multicast flow." Not only does the passage provide a clear definition, I see nothing in the specification inconsistent with this definition that suggests that "multicast index" has a meaning in the '447 patent other than the definition provided. Therefore, I agree with Arista's proposed construction, which is the definition provided in the specification.

76. I have reviewed WSOU's proposed construction, and it appears to me to be only part of the actual definition, but not the entire definition. I do not believe that a POSA would arbitrarily ignore part of the definition in the patent.

IV. THE '884 PATENT

77. The '884 patent is titled "Software Defined Networking Based Congestion Control." At a high level, the '884 patent describes a method of adjusting a bandwidth allocation for a target port. Paraphrasing, claim 1 describes that the method involves monitoring a data flow traversing the target port; determining a bandwidth allocation for the target port; determining a fair-share bandwidth allocation for the target port; and adjusting the bandwidth allocation for the target port based on the fair-share bandwidth allocation.

78. From my review of the '884 patent, my current opinion is that a POSA of the '884 patent would have had a minimum of a B.S. in electrical engineering, computer engineering, computer science, or a related field, as well as 3-5 years of industry experience in networking systems, including working with systems to monitor and react to congestion conditions in a network. Higher education by way of advanced degrees could substitute for years of experience. I reserve the right to alter my opinion in the future should new information be provided to me.

C. "The Network Switching Element"

79. I understand that Arista asserts that claims 17 and 20 are indefinite for "lack antecedent basis" for this term, meaning the term "the network switching element" does not appear earlier in the claim. I understand that a claim may be indefinite where a claim term lacks an antecedent basis such that the scope of the claim is not reasonably certain to a POSA.

80. Claim 17 is set out below, with the term bolded.

> 17. An edge switch for adjusting bandwidth allocation in a communications network, the edge switch including a target port, the edge switch configured to:

monitor a data flow traversing the target port;

determine a bandwidth allocation for the target port, the bandwidth allocation for the target port being a bandwidth that is currently allocated for the data flow;

determine a fair-share bandwidth allocation for the target port, the fair-share bandwidth allocation being a proportional allocation of a total bandwidth of **the network switching element**; and

adjust the bandwidth allocation for the target port based on the fair-share bandwidth allocation.

Claim 20 is set out below, with the term bolded.

20. A Software Defined Networking (SDN) controller for adjusting bandwidth allocation in a communications network, the SDN controller being configured to control an aggregation switch, the aggregation switch including a target port, the SDN controller configured to:

receive data flow information from **the network switching element**, the data flow information including information about data flows traversing of the target port;

determine a bandwidth allocation of the target port based on the data flow information, the bandwidth allocation of the target port being a bandwidth that is currently allocated for each of the data flows traversing the target port;

determine an over-subscription ratio, the over-subscription ratio being a ratio of the bandwidth allocation of the target port to a number of data flows traversing the target port; and

transmit the over-subscription ratio to the aggregation switch based on the over-subscription ratio and a threshold value;

determine a fair-share bandwidth allocation for the target port based on the over-subscription ratio and the threshold value, the fair-share bandwidth allocation being a proportional allocation of a total bandwidth of **the network switching element**; and

adjust the bandwidth allocation for the target port based on the fair-share bandwidth allocation.

81. I agree a plain reading of the claims reveals that "the network switching element" does not have an antecedent basis in either claim 17 or claim 20. There is no recitation "a network

switching element" in these claims. Thus, it is unclear what "the network switching element" refers to in the claims.

82. In reviewing the file history of the '884 patent, I see that "the network switching element" was added to these claims to overcome a prior art rejection. *See* Ex. 1, '884 File History, March 30, 2016 Amendment. In fact, in this amendment every instance of "network element" in the pending claims was replaced with "network switching element." In the remarks provided with this amendment, the applicants stated that the prior art raised by the examiner, U.S. Patent No. 8,949,444 ("Ma"), "teaches a flow control scheme that takes place at a proxy device 120." Ex. 1, '884 File History, March 30, 2016 Amendment. The applicants argued that "Ma does not monitor data traveling through a 'target port' of the proxy device 120, itself. Instead, Ma only monitors data flows from ports that are at the user device 110 or the resource 130, where the user device 110 and resource 130 are not a 'network switching element' (as recited in claim 1)." *Id.* The applicants also stated that the same arguments could be made for claim 17. *See id.* But while the applicants asserted that these devices are not a "network switching element," they did not explain what a "network switching element" is.

83. The specification also does not use the term "network switching element," so a POSA would not have anything there to use as a guide to determine what "the network switching element" refers to in claims 17 and 20. The specification does use the term "network element," as the original claims did. The specification informs a POSA about some characteristics of a "network element." For example, a network element resides in a communications network. *See* '884 patent at 1:45-47. A network element may have at least one port, and may have a plurality of ports. *See* '884 patent at 1:50-51, 3:15-19. A network element may be "associated with a secondary network element," which has its own set of ports. '884 patent at 3:43-48. A network

element may be "one or more user agents." '884 patent at 8:42-46. And a network element may be a number of different kinds of network equipment. *See* '884 patent at 12:21-34. Thus, the specification does not make it reasonably certain for a POSA what "the network switching element" refers to in claims 17 and 20.

84. Claim 17's preamble refers to an edge switch and "adjusting bandwidth allocation in a communications network." Because a network switching element may refer to any number of devices in the communications network, the lack of antecedent basis renders the scope of the claim unclear.

85. Claim 20's preamble refers to a "Software Defined Networking (SDN) controller," a "communications network," and "an aggregation switch." I note that the specification states that the SDN controller may itself be included in a switch. *See* '884 patent at 11:35-40. Like claim 17, because a network switching element may refer to any number of devices in the communications network, the lack of antecedent basis renders the scope of the claim unclear.

86. I understand that WSOU believes that no construction is necessary, but also provides an alternative construction: "The device comprising one or more of a virtual machine, a virtual network interface card, a virtual switch, and a physical network interface card." WSOU cites 9:27-40 of the '884 patent for this construction. This part of the specification describes particular "network devices 205," which are described to include virtual machines, virtual network interface cards, virtual switches, and physical network interface cards. The specification states that all of these components are included, not just "one or more" as in WSOU's proposed construction. Regardless, it is unclear why WSOU finds its cited passage to be particularly relevant to claims 17 and 20. The term "network device" is defined in the specification and is extremely broad, encompassing far more than the passage at 9:27-40:

> As used herein, the term "network device", may be considered synonymous to and/or referred to as a networked computer, networking hardware, network equipment, router, switch, hub, bridge, gateway, or other like device. The term "network device" may describe a physical computing device of a wired or wireless communication network and configured to host a virtual machine. Furthermore, the term "network device" may describe equipment that provides radio baseband functions for data and/or voice connectivity between a network and one or more users.

'884 patent at 7:18-27. But the claims do not refer to a "network device"—they refer to a "network switching element." And while that term is not used in the specification, as described above "network element" is used in the specification, and was originally used in the claims. Therefore, I see no reason why a POSA would look to the passage at 9:27-40 to try and understand what "the network switching element" means in claims 17 and 20, or to try and resolve any ambiguity due to the lack of antecedent basis.

87. Moreover, as explained above regarding the file history, to construe "the network switching element" as proposed by WSOU would seem to amend the claims again. The claims said "the network element." The applicants amended that to "the network switching element" to avoid prior art that they said did not include "network switching elements." WSOU's proposal would change the term to "the network device." WSOU's construction would recapture the devices like the proxy device, user device, and resource that the applicants amended the claims to avoid. So not only do I think that WSOU's proposed construction does not resolve the ambiguity, it is also an improper construction.

I declare under penalty of perjury of the laws of the United States that the foregoing is true and correct. Executed in San Francisco, California.

Dated:___July 26, 2021_____ ____  ____

John R. Black, Ph.D.